Distributed Air-Ground Traffic Management Meeting, September 10-19, 2002

Agenda

Schedule

I. Background on DAG-TM Research

II. Overview of September 2002 Experiment

BREAK

III. Detailed description of experimental conditions:

- Center Airspace:
  - En route trajectory negotiation (CE-6)
  - En route free maneuvering (CE-5)
  - Baseline
- TRACON Airspace:
  - In trail self-spacing (CE-11)
  - Baseline

I. Background: Distributed Air-Ground Traffic Management Research

Human Factors and Operations Project
NASA Ames Research Center

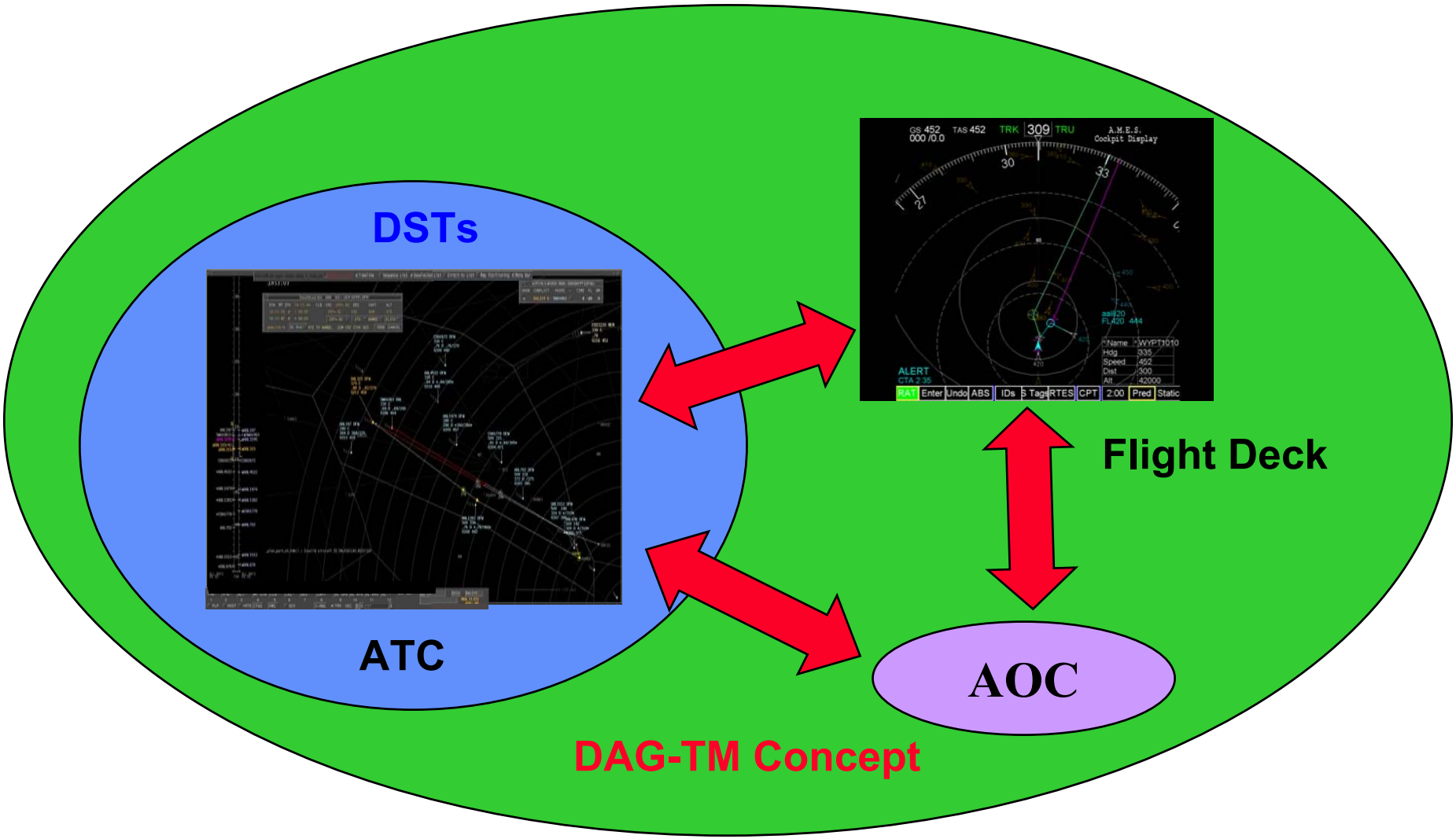
Advanced Air Transportation Technologies Project

- **Goal**
  - **In alliance with the FAA, enable the next generation of increases in efficiency, flexibility, capacity, and safety of aircraft operations within the US and global airspace system.**
- **Focus**
  - **Develop human-centered automation to assist air traffic management in short and intermediate term decision making between pilots, controllers, and dispatchers.**

Focus Areas

- Develop en route and terminal decision support tools for FAA Free Flight Phases 1 and 2
  - Enhance capabilities of present air traffic system
  - Deliver CTAS decision support tools to the FAA
- Distributed Air-Ground Traffic Management (DAG-TM) Research
  - Free Flight concept exploration
  - Evaluate feasibility of making major changes to current system and procedures
  - Deliver tested concepts to the FAA

Automation Tools and DAG-TM



DAG-TM Concept Elements

- Four concept elements (CEs) are being pursued:
  - CE-5: Free Maneuvering for User-preferred Separation Assurance and Local traffic flow management (TFM) Conformance
  - CE-6: Trajectory Negotiation for User-preferred Separation Assurance and Local TFM Conformance
  - CE-7: Collaboration for Mitigating Local TFM Constraints due to Weather, Special Use Airspace, and Complexity
  - CE-11: Self-spacing for Merging and In-trail Separation

CE-5:
Free Maneuvering for User-preferred Separation Assurance and Local TFM Conformance

- **Problem:**
  - **Potential traffic separation conflicts may cause controller-issued deviations that are conservative or not preferred by users**
  - **Users may not always be able to fly preferred trajectories**
- **Solution:**
  - **Air: Cockpit Display of Traffic Information (CDTI)-equipped aircraft maneuver freely for separation assurance**
  - **Ground: Controller monitors separation (with complementary ground-based tools) and provides separation assurance for non-equipped aircraft**

CE 6:
Trajectory Negotiation for User-preferred Separation Assurance and Local TFM Conformance

- **Problem:**
  - **Potential traffic separation conflicts may cause controller-issued deviations that are conservative or not preferred by users**
  - **Users may not always be able to fly preferred trajectories**
- **Solution:**
  - **User and controller negotiate for efficient resolution of conflicts**
  - **User-controller data exchange (intent, winds) for improved trajectory prediction**
  - **Controller uses enhanced DSTs with conflict detection & resolution capabilities**
  - **ATC moves to a "trajectory-based" orientation**

CE 11:
Self-Spacing for Merging and In-trail Separation

- **Problem:**
  - **Conservative spacing buffers on final approach reduce arrival throughput and airport capacity**
- **Solution:**
  - **CDTI-equipped aircraft are cleared to maintain separation relative to a leading aircraft:**
    - **Flight deck displays and guidance for:**
      - **Self-spacing and merging**
      - **Fine tuning of fixed-time spacing**
  - **Controller displays & procedures for shared separation responsibility**

Research Plans

- Develop and test decision support tools
- Three years of DAG-TM research
  - Develop and clarify concepts
  - Involve users (pilots, controllers, and dispatchers)
  - Conduct laboratory demonstrations of concepts
- Goal is to evaluate feasibility and potential benefits
- Deliver information and prototypes to the FAA by 2004

[End of Background: DAG-TM Research]